

2023 Annual Ongoing Data Requirements Report

Data Requirements Rule for the 2010 Sulfur Dioxide Standard



**Submittal Due Date
July 1, 2023**

**Missouri Department of Natural Resources
Division of Environmental Quality
Air Pollution Control Program
P.O. Box 176
1659 East Elm Street
Jefferson City, Missouri 65102
Telephone 573-751-4817**

June 14, 2023

Meg McCollister
Regional Administrator
U.S. EPA, Region VII
11201 Renner Boulevard
Lenexa, KS 66219

RE: 2023 Annual Ongoing Data Requirements Report for SO₂

Dear Meg McCollister:

The Missouri Department of Natural Resources' Air Pollution Control Program (Air Program) is submitting the state's stand-alone annual ongoing data requirements rule (DRR) report pursuant to the federal DRR for the 2010 sulfur dioxide (SO₂) standard. The annual ongoing DRR report is due to the U.S. Environmental Protection Agency (EPA) on July 1, 2023, to meet the reporting requirements in 40 CFR 51.1205 (b).

The 2023 report addresses four areas where modeling of actual SO₂ emissions served as the basis for designating the areas as attainment/unclassifiable in EPA's Federal Register notice on January 9, 2018. The Air Program recommends that no additional modeling is needed for all four attainment/unclassifiable areas based on the technical analysis in the attached report.

This year's report removes the Montrose facility (Henry County) from the 2023 DRR Report, as approved by U.S. EPA, Region VII, on April 14, 2023.

As required in 40 CFR 51.1205, the Air Program is making this final stand-alone report available for public inspection and review on our website. The Air Program also accepted comments on a draft of the report from May 5, 2023, to June 5, 2023. The Air Program received one comment from City Utilities regarding the 2022 Operating Time (hours) for John Twitty City Utilities listed in Table 3. The Air Program revised Table 3 in the final report as a result of this comment.


Thank you for your attention to this matter. If you have any questions regarding the report, please contact Mark Leath, with the Department's Air Pollution Control Program at

Meg McColister
Page Two

P.O. Box 176, Jefferson City, MO 65102 or by phone at (573) 526-5503 or email at mark.leath@dnr.mo.gov.

Sincerely,

AIR POLLUTION CONTROL PROGRAM



Stephen M. Hall
Director

SMH: sds

Enclosures: 2023 Annual Ongoing Data Requirements Report

c: Steven Brown – U.S. EPA, Region VII - steven.brown@epa.gov
File# 2022-SO2-DRR-I

Purpose and Background

The Missouri Department of Natural Resources' Air Pollution Control Program (Air Program) has prepared this report as the state's stand-alone annual ongoing data requirements report for the 2010 1-hour sulfur dioxide (SO₂) primary national ambient air quality standard (2010 SO₂ Standard). This report is intended to fulfill the annual reporting requirements of the federal SO₂ data requirements rule (DRR), 40 CFR Part 51 Subpart BB, "*Data Requirements Rule for Characterizing Air Quality for the Primary SO₂ NAAQS*". According to the rule, the Air Program must submit the annual ongoing data requirements report to the U.S. Environmental Protection Agency (EPA) on July 1 each year to meet the reporting requirements in 40 CFR 51.1205 (b):

“(b) Modeled areas. For any area where modeling of actual SO₂ emissions serve as the basis for designating such area as attainment for the 2010 SO₂ NAAQS, the air agency shall submit an annual report to the EPA Regional Administrator by July 1 of each year, either as a stand-alone document made available for public inspection, or as an appendix to its Annual Monitoring Network Plan (also due on July 1 each year under 40 CFR 58.10), that documents the annual SO₂ emissions of each applicable source in each such area and provides an assessment of the cause of any emissions increase from the previous year. The first report for each such area is due by July 1 of the calendar year after the effective date of the area's initial designation.

(1) The air agency shall include in such report a recommendation regarding whether additional modeling is needed to characterize air quality in any area to determine whether the area meets or does not meet the 2010 SO₂ NAAQS. The EPA Regional Administrator will consider the emissions report and air agency recommendation, and may require that the air agency conduct updated air quality modeling for the area and submit it to the EPA within 12 months.”

Missouri currently includes four areas that are subject to the ongoing reporting requirements for modeled areas under the DRR. On January 9, 2018, EPA designated Jasper, Greene, and Randolph Counties, as well as a portion of St. Louis County as attainment/unclassifiable for the 2010 SO₂ standard.¹ These designations were based on modeling analyses the Air Program performed utilizing actual SO₂ emissions, meaning they are subject the reporting requirements in 40 CFR 51.1205 (b).

The Air Program submitted the first annual report pursuant to 40 CFR 51.1205(b) in 2017. The first two reports the Air Program submitted included only one area (Scott County), and the other five areas had not yet been designated. The reports submitted in 2019-2021 all included six areas in Missouri. In the report submitted in 2022, the Air Program removed the Sikeston facility (Scott County) from the annual report, and the report included five areas in Missouri following EPA approval to do so pursuant to 40 CFR 51.1205(b)(2). In the report submitted in 2022, the Air Program also included a modeling analysis showing that all the receptors around the Montrose Power Station (located in Henry County) had modeled design values below 50 percent of the level of the 2010 SO₂ standard, and requested to remove Montrose from future reporting requirements pursuant to 40 CFR 51.1205(b)(2). On April 14, 2023, EPA approved the Air Program's request to remove the area surrounding the Montrose facility (Henry County) from the future ongoing reporting requirements under the DRR for modeled areas.

¹ 83 FR 1098, January 9, 2018

2022 Annual Emissions

Per 40 CFR 51.1205 (b), the Air Program is required to document the annual SO₂ emissions of all modeled DRR sources. Table 1 lists the four modeled DRR sources in Missouri and details their respective annual actual SO₂ emissions in 2022. The Air Program acquired emission data from EPA's Clean Air Markets Division (CAMD) database, which is based on Continuous Emissions Monitoring System (CEMS) data measured in compliance with 40 CFR Part 75.

Table 1 – 2022 Actual Annual SO₂ Emissions for Missouri's Modeled DRR Sources

DRR Facility Name	County Name	DRR Facility FIPs	2022 SO ₂ Emissions (tons)
Meramec	St. Louis	(189-0010)	309
Asbury	Jasper	(097-0001)	0
John Twitty City Utilities	Greene	(077-0039)	3,153
Thomas Hill	Randolph	(175-0001)	13,534

Comparison of 2022 Emissions to Previous Year

Per 40 CFR 51.1205 (b), the Air Program is required to provide an assessment of the cause of any emissions increase from the previous year for all modeled DRR sources. Table 2 provides the 2021 and 2022 actual annual SO₂ emissions for the four modeled DRR sources along with the difference in annual emissions between the two years. As seen in the table, from 2021 to 2022, emissions remained constant or decreased at three of the four sources and increased at one of the sources. John Twitty City Utilities (facility FIPS 077-0039) is the facility where SO₂ emissions increased between 2021 and 2022. This increase is highlighted in the last column of Table 2. Asbury (097-0001) is retired and had no emissions in 2021 or 2022.

Table 2 – 2021 and 2022 Emissions Comparison for Missouri's Modeled DRR Sources

DRR Facility Name	2021 SO ₂ Emissions (tons)	2022 SO ₂ Emissions (tons)	2021-2022 Comparison*
Meramec	1,539	309	-1,230
Asbury	0	0	0
John Twitty City Utilities	2,498	3,153	655
Thomas Hill	16,193	13,534	-2,659

*A positive value in the last column indicates an increase in emissions from 2021 to 2022; a negative value indicates a decrease in emissions from 2021 to 2022.

Assessment of Annual Emission Increases from 2021 to 2022

As stated above, the Air Program must provide an assessment of the cause of any emissions increase from the previous year for the modeled DRR sources. As shown in Table 2 above, annual SO₂ emissions increased at John Twitty City Utilities facility from 2021 to 2022. To provide this required assessment, the Air Program evaluated the cause of the annual SO₂ emissions increase at this facility.

This facility is a coal-fired power plant that provides electricity to the grid for sale to their customers. Year-to-year emission fluctuations at these types of facilities are common due to utilization rates as power generators operate to follow electricity demand, which varies every year. Additionally, in some years, units come down for weeks or months for routine maintenance, which can also add variability to the emissions in any given year. To determine whether this year-to-year variability in electricity production at this facility was the cause of the emissions increases, the Air Program obtained the annual operating hours

and gross load produced by the units at this facility in 2021 and 2022 from EPA's CAMD database. Table 3 provides this information for each unit at this facility along with the facility total for these figures. The following sections provide the Air Program's assessment of the cause of the emissions increases at these three facilities from 2021 to 2022.

Table 3 - Operating Hours/Gross Load for 2021-2022 John Twitty City Utilities

Facility Name	Year	Unit ID	Operating Time (hours)	Operating Time (facility combined – hours)	Gross Load (MW-h)	Gross Load (facility combined – MW-h)
John Twitty City Utilities	2021	1	5,394	12,898	810,314	2,678,573
		2	7,504		1,868,258	
	2022	1	6,957	13,130	1,195,221	2,799,673
		2	6,173		1,604,452	

John Twitty City Utilities – Assessment of 2021 to 2022 Annual Emissions Increase

From 2021 to 2022, the actual annual SO₂ emissions from this facility increased by 26 percent. This corresponds to an increase of 655 tons of SO₂ emissions between these two years. As seen in Table 3, the operating time and gross load at the facility increased by 2 percent and 5 percent, respectively, between these two years. Based on this information, the year-to-year variability in electricity production at the facility (increases in operating time and generation) is part of the cause of the annual SO₂ emissions increase from 2021 to 2022.

Also as seen in Table 3, Unit 1 increased operating hours by approximately 29 percent, and gross load by approximately 45 percent between 2021 and 2022. Unit 2, on the other hand, decreased operating time and gross load by approximately 18 percent and 14 percent, respectively, between 2021 and 2022. This means a much larger portion of the operating hours and generation came from Unit 1 in 2022 when compared to 2021. Unit 1 is not equipped with an SO₂ scrubber, but Unit 2, which is a much newer unit is equipped with an SO₂ scrubber. Therefore, the SO₂ emission rate for Unit 1 is much higher than the SO₂ emission rate at Unit 2. Since Unit 1 has a higher emissions rate and made up a higher percentage of the facility-wide operating hours and generation in 2022, the Air Program has determined this to be the driving cause of the annual SO₂ emissions increase between the two years.

Recommendations Regarding Updated Modeling

In addition to the assessment of the annual SO₂ emissions fluctuations for each modeled DRR source, 40 CFR 51.1205 (b)(1) requires the Air Program to provide a recommendation in this annual report as to whether updated modeling is needed to characterize air quality in the areas surrounding all modeled DRR sources to determine whether the areas continue to meet the 2010 SO₂ standard. Based on the information and assessment set forth below, the Air Program recommends no updated dispersion modeling analysis is needed for any of Missouri's modeled DRR sources.

In determining the appropriate recommendation regarding the need for any updated dispersion modeling analysis, the appropriate assessment should compare emission characteristics in the most recent year with the emission characteristics that were modeled for the DRR sources to inform their initial attainment designations. Factors for consideration in such a comparison may include total annual emissions, the level of the modeled design value from the initial modeling analysis, other relevant facility-specific information, and where appropriate, hourly emission profiles, or daily maximum 1-hour emission rates.

The Air Program's assessment to determine the appropriate recommendation regarding the need for updated modeling first evaluates the average annual emission totals that were modeled for the four DRR sources. The Air Program then compared these values against the actual annual emissions from 2022 for the same sources. In the modeling used to inform the initial designations, the modeled emissions from Missouri's four modeled DRR sources demonstrated compliance with the 2010 SO₂ standard. Therefore, if actual emissions in the most recent year are lower than the modeled emissions, it is reasonable to assume any updated modeling analysis utilizing the lower emission levels from the more recent year would also demonstrate compliance with the standard.

Table 4 shows the average annual modeled emissions, the modeled design values, and the modeled emission years used to inform the initial attainment designations for the four modeled DRR sources. The table also provides the 2022 actual emissions for these four facilities and a comparison of the 2022 emissions to the average annual modeled emissions. For three of the four of Missouri's modeled DRR sources, the 2022 actual emissions are less than the average annual modeled emissions used to inform the initial attainment designation (either 2012-2014 or 2013-2015, as applicable). Therefore, any additional modeling for the three sources where emissions in 2022 were less than the modeled emissions would likely result in lower maximum-modeled design values than those listed in Table 4. This supports a recommendation for no updated modeling at these three sources.

Table 4 – Modeled Design Values and Comparison of Modeled Emissions to 2022 Actual Emissions for Missouri's Modeled DRR Sources

DRR Facility Name	Maximum Modeled Design Value (ppb)	Years of Modeled Emissions Data	Average Annual Modeled SO₂ Emissions (tons)	2022 Actual SO₂ Emissions (tons)	Comparison - Modeled Emissions vs. 2022 Emissions (tons)*
Meramec	52.98 [^]	2013-2015 [^]	5,541 [^]	309	-5,232
Asbury	67.5	2012-2014	6,695	0	-6,695
City Utilities John Twitty	42.9	2013-2015	2,759	3,153	+394
Thomas Hill	52.1	2013-2015	16,582	13,534	-3,048

* A positive value in the last column indicates the 2022 emissions were higher than the average annual modeled emissions; a negative value indicates 2022 emissions were lower than the average annual modeled emissions.

[^] The 2013-2015 average annual modeled emissions at Meramec in this table only include the average actual emissions from Units 3 and 4 during these three years. The 2013-2015 modeling performed for designations for the Meramec facility utilized 2013-2015 actual emissions from Units 3 and 4 and natural gas combustion in Units 1 and 2. An enforceable permit condition required exclusive use of natural gas in Units 1 and 2, effective starting in 2016.

The following discussions include facility-specific details considered in developing the Air Program's recommendations regarding the need for additional modeling for all four of Missouri's modeled DRR sources.

Asbury, Jasper County - FIPS (097-0001)

This facility had no SO₂ emissions in 2022. The facility officially retired on March 31, 2020. Therefore, no SO₂ emissions are expected from this facility going forward. The Air Program recommends no additional modeling for the area surrounding the Asbury facility.

Meramec, St. Louis County - FIPS 189-0010

For this facility, annual SO₂ emissions in 2022 were 5,232 tons/year less than the average annual modeled emissions from 2013-2015. This is a decrease of 94 percent between current actual emissions and the emissions the Air Program modeled to inform the original attainment designation. Therefore, any updated modeling would be expected to result in even lower modeled SO₂ concentrations that would also demonstrate continued attainment in the area surrounding this source. Therefore, the Air Program recommends no additional modeling for the area surrounding the Meramec facility.

City Utilities John Twitty, Greene County - FIPS 077-0039

For this facility, the annual SO₂ emissions in 2022 were 394 tons/year more than the average annual modeled emissions from 2013-2015. This is 14 percent higher than the average annual modeled emissions used to inform the original attainment designation. This increase is attributed to the increase in operating hours and gross load of Unit 1, which operates without an SO₂ scrubber. In order to determine the appropriate recommendation for whether additional modeling is needed to determine ongoing compliance with the 2010 SO₂ standard for the area surrounding this facility, the air program performed a more in depth hourly emissions profile analysis for the facility.

Compliance with the 2010 SO₂ standard is based on a comparison of the 1-hour design value to the level of the standard (75 ppb). In the modeling used to inform the designations, the 1-hour design value was determined by taking a three-year average of the annual 99th percentile daily maximum 1-hour concentrations. This is the same way a design value would be calculated for a SO₂ monitor. This calculation is performed for each receptor included in the modeling domain, which gives each receptor a different 1-hour design value. The receptor with the highest 1-hour design value is considered the maximum modeled concentration and corresponds to the values listed in Table 4. Therefore, in evaluating the need for additional modeling at this facility, the air program obtained the hourly emissions data for Units 1 and 2 at the facility from 2013-2015, which was used in the modeling, along with the hourly emissions data for these units in 2022. With this data, the air program first summed the hourly emissions data for Units 1 and 2 to determine the hourly emissions from Units 1 and 2. For the modeled years (2013-2015) these maximum daily values were sorted from highest to lowest and then averaged across the three years to determine the average highest, second highest, third highest, etc. daily maximum hourly emission rates for the facility during the modeled years. The air program also determined the daily maximum hourly emission rates from these two units combined for the year 2022 and sorted from highest to lowest. The Air Program then compared the top 40 max daily hourly values to the average top 40 daily maximum average values from the modeled years (2013-2015). This provides a direct comparison of maximum daily hourly emissions for the two time periods, which, absent meteorology, provides a strong comparison of emission changes at the facility, which are likely to most directly affect the 1-hour modeled design value.

Table 5 provides the top 40 daily maximum 1-hour facility-wide emission rates from 2022 along with the average of these top 40 values from 2013-2015. As shown in the table the top 40 daily maximum 1-hour emission rates in 2022 were all lower than the corresponding average values from the modeled years (2013-2015). Since the maximum daily hourly emissions are all less than the corresponding values that were modeled, then although annual emissions increased in 2022 when compared to the average emissions that were modeled, a new modeling analysis would likely result in a maximum modeled 1-hour design value that is lower than the value included in Table 1 for this facility. Therefore, this hourly emission rate comparison supports a recommendation for no additional modeling at the John Twitty facility

Table 5. John Twitty (Units 1 & 2 combined) Daily Maximum 1-Hour SO₂ Emissions

Rank	Daily Maximum 1-Hour SO ₂ Emissions (lb/hr)		Percent Change (2022 vs. 2013-2015 average)
	2013-2015 Average	2022	
1st highest	2,559	2,187	-14.54%
2nd highest	2,473	2,026	-11.56%
3rd highest	1,980	1,834	-7.37%
4th highest	1,917	1,754	-8.50%
5th highest	1,887	1,571	-16.75%
6th highest	1,826	1,456	-20.26%
7th highest	1,805	1,423	-21.16%
8th highest	1,786	1,248	-30.12%
9th highest	1,752	1,241	-29.17%
10th highest	1,745	1,241	-28.88%
11th highest	1,735	1,239	-28.59%
12th highest	1,732	1,218	-29.68%
13th highest	1,707	1,216	-28.76%
14th highest	1,699	1,215	-28.49%
15th highest	1,684	1,209	-28.21%
16th highest	1,678	1,204	-28.25%
17th highest	1,660	1,198	-27.83%
18th highest	1,655	1,193	-27.92%
19th highest	1,648	1,188	-27.91%
20th highest	1,640	1,186	-27.68%
21st highest	1,635	1,186	-27.46%
22nd highest	1,632	1,184	-27.45%
23rd highest	1,627	1,183	-27.29%
24th highest	1,621	1,182	-27.02%
25th highest	1,605	1,181	-26.42%
26th highest	1,602	1,179	-26.40%
27th highest	1,598	1,179	-26.22%
28th highest	1,590	1,175	-26.10%
29th highest	1,571	1,174	-25.27%
30th highest	1,564	1,173	-25.00%
31st highest	1,556	1,172	-24.68%
32nd highest	1,547	1,166	-24.63%
33rd highest	1,544	1,165	-24.55%
34th highest	1,539	1,165	-24.30%
35th highest	1,535	1,163	-24.23%
36th highest	1,522	1,162	-24.20%
37th highest	1,515	1,161	-23.37%
38th highest	1,507	1,161	-22.96%
39th highest	1,504	1,159	-22.94%
40th highest	1,498	1,153	-23.03%

Thomas Hill, Randolph County - FIPS 175 0001

For this facility, annual SO₂ emissions in 2022 were 3,048 tons/year less than the average annual modeled emissions from 2013-2015. This is a decrease of 18 percent between current actual emissions and the emissions the Air Program modeled to inform the original attainment designation. Therefore, any additional modeling is expected to similarly demonstrate continued attainment in the area surrounding this source. The Air Program recommends no additional modeling for the area surrounding the Thomas Hill facility.

Public Inspection and Review

As required in 40 CFR 51.1205, the Air Program will make the final stand-alone report available for public inspection and review on our public website. The final report will also be available for review at the Missouri Department of Natural Resources, Air Pollution Control Program, 1659 Elm St., Jefferson City, (573) 751-4817.

The Air Program also made the proposed version of the report available for public review and comment prior to finalizing it, specifically –

- Notice of the availability of the proposed stand-alone ongoing data requirements report was posted on the program website by May 5, 2023.
- The Air Program opened a 30-day public comment period for the proposed report on May 5, 2023 after posting it on the website. The public comment period closed on June 5, 2023.
- After posting the proposed report, the Air Program sent an email announcement to notify the public of the availability of the report and the corresponding public inspection and comment period. Email recipients included all individuals who have signed up to receive email updates for Air Program public notices.

Conclusion

This report fulfills the Air Program's obligation to submit an annual ongoing data requirements report for Missouri's modeled DRR sources. The report includes an evaluation of the most current year of emissions data at the modeled sources, an assessment of the cause of any SO₂ emission increases at these sources from the previous year, and the Air Program's recommendations regarding the need for additional modeling to evaluate the continued attainment status for the areas surrounding these sources. The Air Program recommends that no additional modeling is needed for any of the modeled DRR sources.